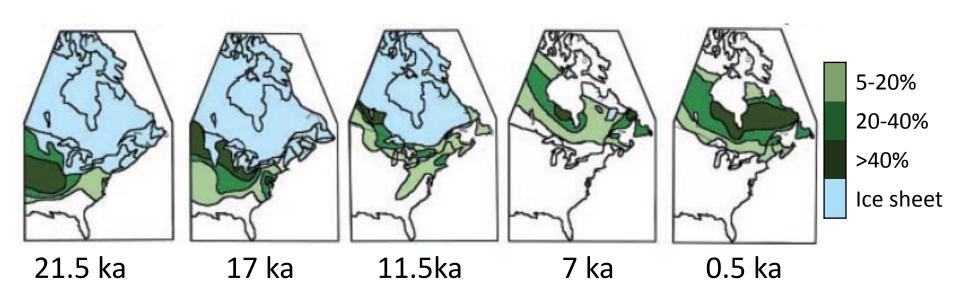
Past efforts inform the potential for assisted colonization as an adaptation tool

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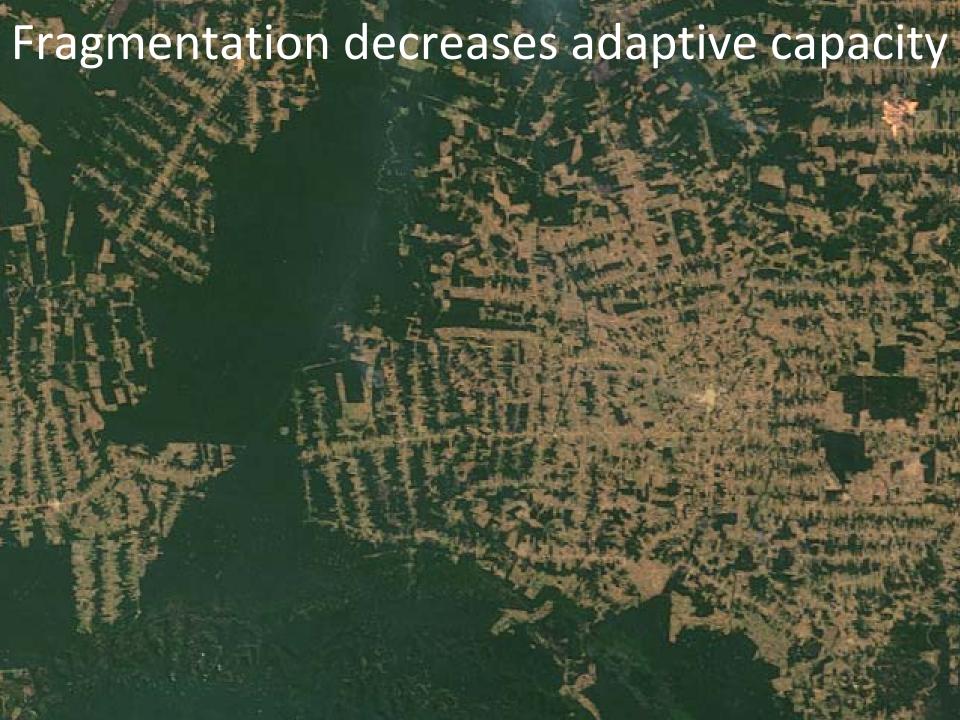
April 3, 2013

Range shifts are a natural response to climate change...



Davis and Shaw 2001

...but modern climate change will be much **faster** than what species have experienced before.



Options

Risk averse Risk prone

Approach:

- Boost resilience
- More of the same
- Trend- & modelinformed decisions
- Scenarios

 Pre-empt specific predictions

Example actions:

- Mitigate other threats
- protect maximum area

- Build connectivity
- Diversify cultivars
- Translocate species to future habitat
- Protect future hotspots

Heller and Zavaleta 2009

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Conservation Translocation

The intentional movement of organisms from one area with free release in another, with the goal of conserving the target species

Re-introduction

The release of an organism within its native range from which it has disappeared in historic times.

Introduction

The release of an organism **outside** of its historically known native range.

Assisted Colonization

Introductions motivated by climate-induced threats

Options

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Translocations are not a new conservation strategy

So what can we learn from our experience? When might assisted colonization be effective?

Avian Reintroduction & Translocation Database

species: >150

release sites: >700

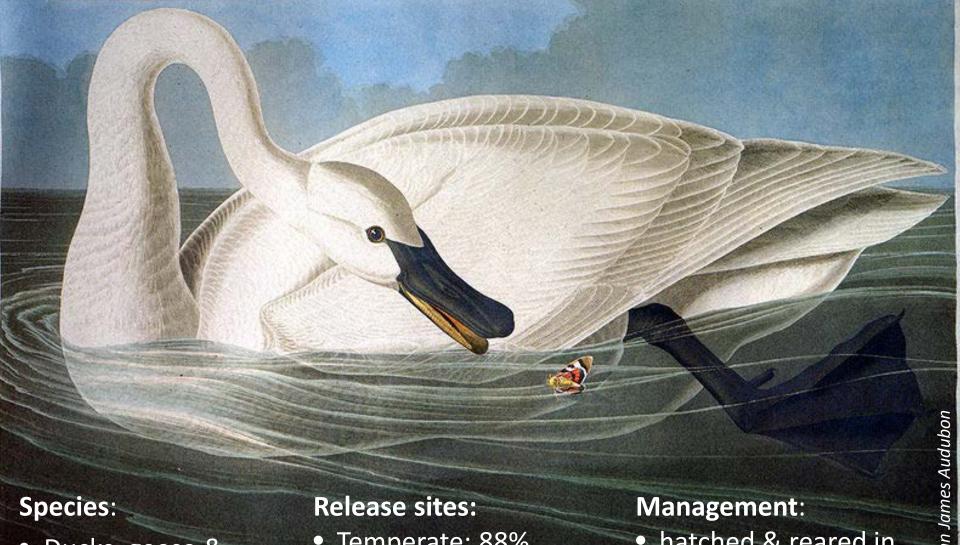
www.lpzoosites.org/artd

Lincoln Park Zoo

Dept. of Conservation & Science

- 1. What does a typical translocation look like?
- 2. How effective are translocations?
- 3. What determines whether a specific translocation is successful?
- 4. How applicable is our experience to climate adaptation?

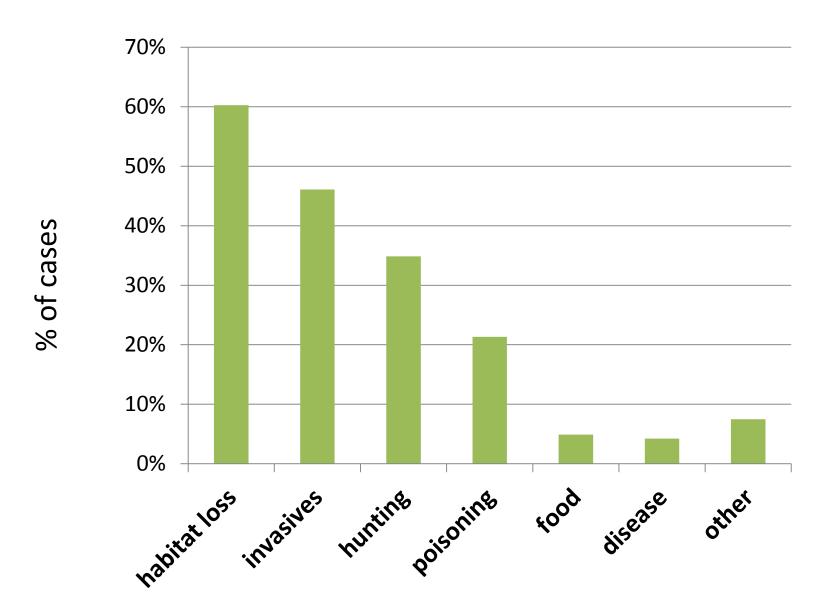
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- Ducks, geese & swans: 13%
- Trumpeter swan released in 40 locations

- Temperate: 88%
- Forests: 46%
- Protected habitat: 93%
- in New Zealand: 42%
- hatched & reared in captivity
- 17.5 birds / year
- mitigate the underlying threat: 94%

Reason for decline at native site



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- 4. How applicable is our experience to climate adaptation?

2. How effective are translocations?

It depends how you define success:

• 41% of individuals survive 1+ year after their release (n=198)

• 67% of populations successfully breed (n=376)

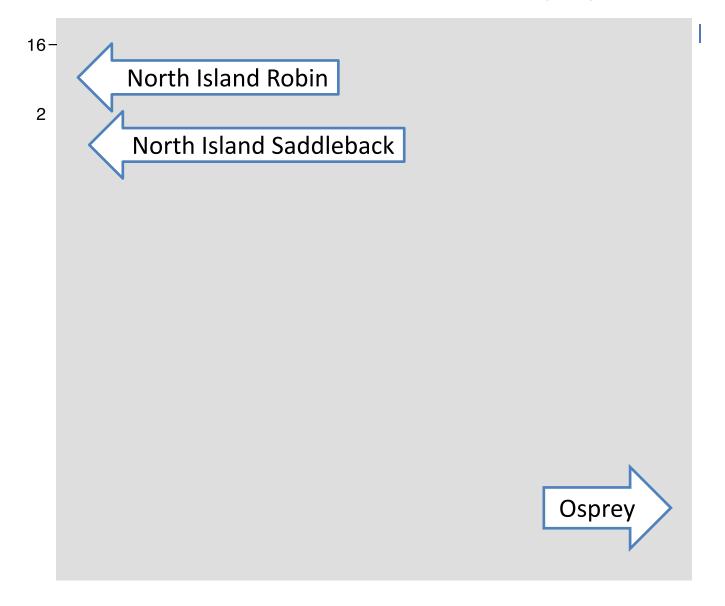
• 69% of populations persist 1+ year after the last release (n=226)

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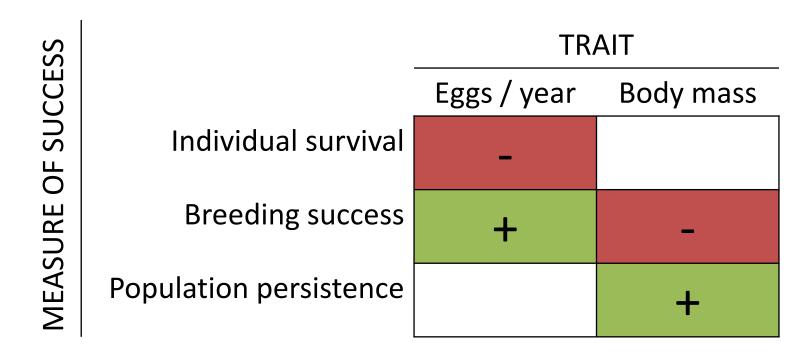
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Translocation success varies by species...



species

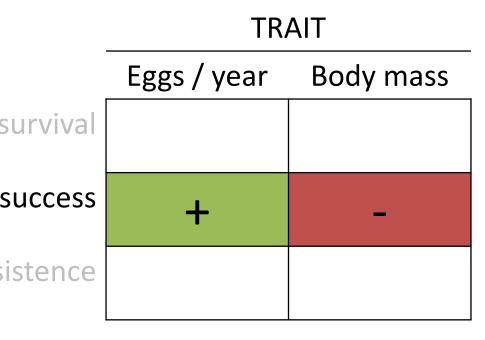
Life history traits correlate with success



Life history traits correlate with success

MEASURE OF SUCCESS

LESS	
r 500	Individual survival
URE U	Breeding success
EASC	Population persistence





Life history traits correlate with success

MEASURE OF SUCCESS

Individual survival
Breeding success
Population persistence

	Eggs / year	Body mass		
urvival	-			
success	+	-		
istence		+		

TRAIT



- 1. What does a typical translocation look like?
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Effort is correlated with success

Success is associated with:

Mitigating the underlying threat

Greater release site preparation

Releasing more animals per year

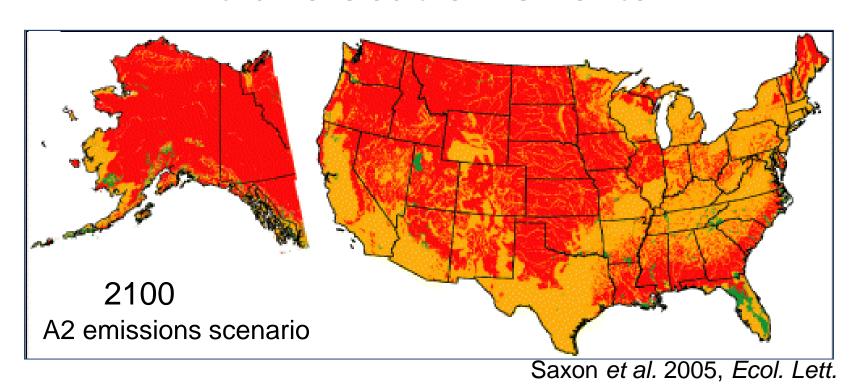
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Assisted colonization will necessarily focus on longer-distance introductions

We are relatively **inexperienced** with this approach.

- Only 7% of cases were introductions
- Median distance: 65 km

Climate change will complicate translocation efforts

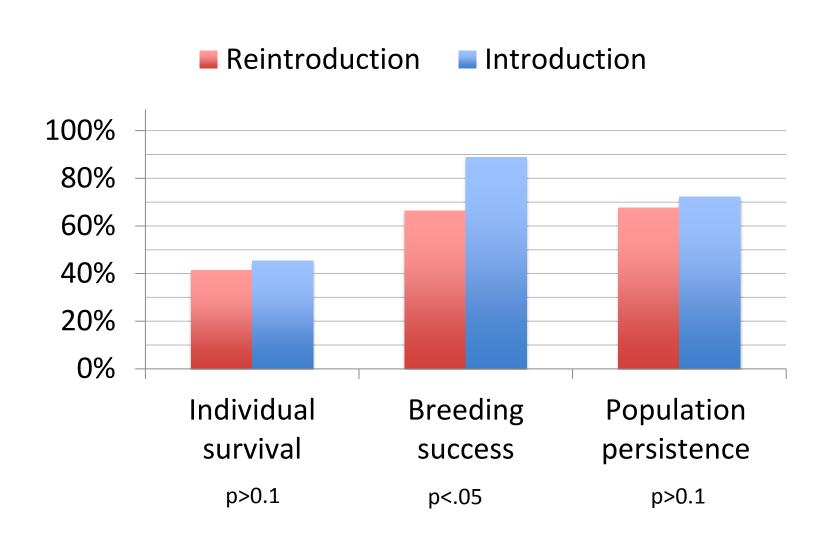


Conditions that will disappear from U.S.

Conditions that will decrease in extent in U.S.

Conditions that will increase in extent in U.S.

Introductions are as successful as reintroductions



Conclusions

- We've done similar things before and can learn from past efforts
- 2. Translocation success is correlated with
 - Species life history traits
 - Our efforts
- 3. We're lacking in direct experience, and climate change will complicate things.
- 4. We need a more nuanced, context-dependent approach when considering adaptation options.

